Mammals and Cryptozoology

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ABSTRACT

Cryptozoology is defined as the "science" of unknown and of hidden or undiscovered animals. It is being increasingly promoted as a classical supplement to paleontology, the science of extinct animals, and to zoology, the science of known and discovered animals. It relies on circumstantial and testimonial evidence rather than the objective and autoptic evidence of paleontologists and zoologists. Strictly zoological evidence of living mammals can be enumerated by dates of technical definition and naming of species, genera, families, and still higher taxa. A roster of living genera and families discovered during the present century has a grand total of 126 genera. The number reached a high point in the first decade but during the last fifty years it has fallen to less than one a year. Only two entirely new families have been discovered so far in this century. Additionally, two genera previously known only as fossils were discovered. Both are members of previously known families, and the already known fossils were not more ancient than late Pleistocene or early Recent. There has been no definite and objective discovery of any living taxa that were previously unknown or hidden in the cryptozoological sense. The pursuit of supposed mammals lacking objective evidence is not a science in an acceptable usage of that word. The probability of future objective evidence of true zoological taxa is small but real for species and is decreasing to zero higher in the hierarchy of superspecific taxa. The roster of living mammals is now more nearly complete than that of any other class of animals with the probable exception of birds. There is little or no good evidence that this roster will be supplemented or completed by cryptozoology.

THE DEFINITION AND DESCRIPTION OF "CRYPTOZOOLOGY"

The term "cryptozoology" was proposed by Bernard Heuvelmans in a large book in French published in 1955, revised by the author and translated into English by Rupert Hart-Davis in 1958, and published in England and in the United States in 1959. (See Heuvelmans, 1955, 1959). He has since published in French another large book on the cryptozoology of Africa (Heuvelmans, 1978). In 1982 an International Society of Cryptozoology was founded with Heuvelmans as president but with two Americans as vice president and secretary-treasurer. There is also a Board of Directors, twelve in number, truly international but with five Americans. This society has started publication of *Cryptozoology,* interdisciplinary journal of the International Society of Cryptozoology. The first part of Volume 1 was issued in Winter 1982. The first article in this journal is by Heuvelmans and is titled "What is Cryptozoology?" (This is translated from French; the whole journal is in English, as is a newsletter printed in the United States and mailed to members of the Society.)

As noted by Heuvelmans (1982) his word "cryptozoology" is derived from Greek kryptos (hidden), zoon (animal), and logos (discourse). He goes on to say that this "means simply 'the science of *hidden* ani-

mals,' just as paleontology is 'the science of *ancient* animals'." He also says that "paleontology . . . [is] an archaic or obsolete study of past living organisms," a statement that paleontologists must consider absurd. Paleontology as a science is neither archaic nor obsolete even though its objective materials are ancient in different degrees.

Heuvelmans goes on to say that, "To establish the reality of an object or event, science . . . has three possible types of proof: autoptical, testimonial, and circumstantial." His argument for the validity of cryptozoology is that not all of the three "proofs" but any one of them can prove the reality of the existence of any phenomenon. Thus either circumstantial or testimonial evidence is to be taken by cryptozoologists as proving the existence of the "hidden" or "unknown" animals that are their subject matter.

Heuvelmans and his now many followers are conscious of the fact that the International Code of Zoological Nomenclature requires that a named animal, whether Recent or fossil, must have a type specimen which is objective and available for professional examination or (usually *and*) figured in publication by a reliable zoologist or paleontologist. Heuvelmans, in the here cited essay (1982) deprecates this ruling and says that it banishes many species to "non-existence," that is, the supposed species of "hidden" or "unknown" animals. He notes that Moore and Sylvester-Bradley (1957) proposed that taxa based on trace fossils, such as tracks, be considered "parataxa" and have a system of nomenclature distinct from that of the International Code. In 1958 this proposal was submitted to the International Congress of Zoology, at which the current Code was adopted. The use of parataxa was rejected. The present Code's first edition was published in 1961 and a second, somewhat revised edition still in effect was published in 1964. As provided in the Code, its interpretation and application are supervised by an International Commission on Zoological Nomenclature.

In his attack on the nomenclatural procedure in the Code Heuvelmans quotes Simpson (1961) as deploring "the fact that this very sensible proposition (for a separate nomenclature of parataxa) did not receive official recognition." In fact Simpson did not deplore this fact, he only stated it. Heuvelmans has not understood what the proposal by Moore and Sylvester really was. It explicitly referred to nomenclature of fossils known objectively only from parts and traces not definitely identified as to affinities and precise classification. Moore, who founded and for years edited the massive, multivolume *Treatise on Invertebrate Paleontology* also wrote an editorial preface to what was planned as the last volume ("Part W") of the Treatise, although its publication in 1962 preceded that of several other volumes. In his preface Moore, who died at the age of 82 in 1974, discussed the nomenclature of fossils at considerable length and did not even mention the proposal of a nomenclature of "parataxa." In the same volume Walter Häntzschel (1962) treated "Trace Fossils and Problematica." He concluded that in general the "binary system" (in format that of the Code) "appears to be the most suitable one." He listed systematic descriptions and generic names of footprints and other trace fossils and even some "body fossils" which are imprints of organisms without hard parts. With special reference to tracks and other "trace fossils" that are not "body fossils" Häntzschel remarked that, "the author wants to emphasize again that with the trace fossils the meaning of 'genus' differs much from that applicable to body fossils."

The Kinds of Hidden or Unknown Animals

The cryptozoologists deal with two different subjects. One is the discovery of animals now alive belonging to a taxon already known from fossils and formerly believed to be extinct. The other is the search for animals, evidence for which is only testi-

monial, circumstantial, or both. As the existence of these animals is not autoptical, they are frequently the named subjects of myths. In such cases the aim of cryptozoology is to demythify them, that is, to search hopefully to find the objective, living animal from which the myth developed.

Cryptozoologists believe that many taxa known as fossils may be, or indeed are, still alive and not much different from their fossil relatives or ancestors. A supposed example is the coelacanth *Latimeria,* which Heuvelmans (1959) characterized as "that crossopterygian fish which comes straight out of the Devonian period." That really is mythifying a now well-known and living fish. *Latimeria* is very different from any Devonian fish. It is also different from any late Cretaceous crossopterygian known from fossils approximately sixty-five million years old. Until *Latimeria* was found, seen, and named by a zoologist in 1940 it was believed that the order of fishes Crossopterygii, represented by fossils from early Devonian to late Cretaceous, was extinct. *Latimeria* does belong to this order, but in its "hidden" years since the late Cretaceous it had evolved considerably. It is therefore distinguished from all fossil crossopterygians by its representation of a separate family, Latimeridae. No fossils of this family are known, but it must have had members in or through the pre-Recent Cenozoic era. This large hiatus in the fossil record has a probable explanation in the fact that *Latimeria* is confined to a relatively small area of deep sea in the western part of the Indian Ocean. No fossils of any sort are known from that area or from any region that has been continuously under deep oceanic water throughout the Cenozoic.

Heuvelmans (1982), as the messiah of cryptozoology, has declared that, "Every year, an average of . . . nearly a dozen mammals are discovered." If that is meant to refer only to new species it does not mean that each discovery is of an obviously distinct and previously unknown animal. Any mammal not obviously related to some previously known taxon would be at least a new genus and if even more distinct would represent a new family. Later in the present paper tabulation shows that the average number of acceptably new genera of mammals named during the past fifty years has been less than one per year and that very few completely new families have been found and named during that time. Heuvelmans also asserts that "full catalogs" of mammals and those with "doubtful and controversial points," have been made only for Europe, North America, and Australia. For Africa he asserts that "the best informed authors have deliberately excluded . . . all the species of small size." He adds that there is no equivalent "guide" (a list giving species, genera, families, and orders of mammals) for Asia or South America. Those assertions are incorrect, as will next here be shown.

New Genera of Mammals Discovered from 1900 to 1983

There are now two recent complete lists of all known living orders, families, genera, and species of mammals. One, edited by Honacki, Kinman, and Koeppl (1982) was based on several previous lists including one by Seal and Makey (1974). Some 255 professional mammalogists in many countries contributed to the compilation. It includes taxonomy of families, genera, and species, with type localities and distribution for species, comments from contributors, and ISIS numbers of almost all taxa for computer use. There are no descriptions of the animals listed. The other complete recent list is by Nowak and Paradiso (1983). This is a two-volume work with 1362 pages, supplemented by extra pages of world distribution, charts of all genera, and two indexes. This work was first written by Ernest P. Walker, and the first edition was issued in 1964. The second edition also by Walker with revision by John L. Paradiso appeared in 1968, and a third edition, published posthumously in 1975 (Walker had died in 1969) was again

revised by Paradiso. The 1983 fourth edition is titled *Walker's Mammals of the World* but has been thoroughly revised and augmented by Nowak and Paradiso, who appear as coauthors. It has figures, mostly photographs, of at least one species of every genus and has extensive descriptive matter and lists of species for each genus.

In view of the foregoing strong disagreement with Heuvelmans's statement about the incompleteness of knowledge of living mammals, it is fair to say that the two major works here cited were published after Heuvelmans (1982) was written. However it is noted that these most recent lists of all living mammals were developed from works that were issued earlier, one in 1964 and one in 1974, and so had been available long before Heuvelmans (1982) wrote.

In the following table I have enumerated all the genera of mammals first made known and named in decades of the twentieth century. This is based on the 1983 book edited by Honacki, Kinman, and Koeppl. I have considered that genera named in 1900 or later were known before 1900 if based on or including species named before 1900. For example the genus of bats now known as *Erophylla* Miller, 1906, has as its type a species named in 1861 by Gundlach. Therefore although given the now accepted name in 1906, the genus was definitely known in 1861 and is not counted as a twentieth-century discovery.

The names of orders in this table are those used in the 1983 list cited and are in the sequence of that list. The placing of monotremes, marsupials, and then all sixteen of the here recognized orders of placentals is in the classical sequence. It does not follow that these super-ordinal groupings originated in that sequence, as used to be believed or assumed by zoologists. Several students of marsupials, fossil and living, divide them

Table of Numbers of Genera of Living Mammals Discovered and Named in the Twentieth Century.

	Decades covered								
Names of Orders	1900–09	1910–19	1920–29	1930–39	1940–49	1950–59	1960–69	1970–79	1980–82
MONOTREMATA	0	0	0	0	0	0	0	0	0
MARSUPIALIA	0	4	3	1	0	1	1	1	0
XENARTHRA	0	0	0	0	0	0	0	0	0
INSECTIVORA	4	2	2	0	0	4	0	0	0
SCANDENTIA	0	0	0	0	0	0	0	0	0
DERMOPTERA	0	0	0	0	0	0	0	0	0
CHIROPTERA	8	4	1	1	3	0	3	3	0
PRIMATES	2	0	0	0	0	0	0	0	0
CARNIVORA	0	2	0	0	0	0	0	0	0
CETACEA	0	1	1	1	0	1	0	0	0
SIRENIA	0	0	0	0	0	0	0	0	0
PROBOSCIDEA	0	0	0	0	0	0	0	0	0
PERISSODACTYLA	0	0	0	0	0	0	0	0	0
HYRACOIDEA	0	0	0	0	0	0	0	0	0
TUBULIDENTATA	0	0	0	0	0	0	0	0	0
ARTIODACTYLA	1	0	0	0	0	0	0	1	0
PHOLIDOTA	0	0	0	0	0	0	0	0	0
RODENTIA	25	9	13	5	4	2	5	3	2
LAGOMORPHA	2	0	0	1	0	0	0	0	0
MACROSCELIDEA	0	0	0	0	0	0	0	0	0
TOTALS	42	22	20	8	7	8	9	8	2

GRAND TOTAL—126.

into two or more different orders, but they do not agree as to how many orders should be recognized or what they should be named. The sequence of the placental orders in this list has no clear significance as to times of origin or affinities among the orders except that all are placentals as a very large super-ordinal taxon.

Most of these ordinal names are well known, but three have not been in general use until recently. The "Scandentia" include only the one family of so-called tree-shrews, the Tupaiidae. This family is of disputed relationships, having been commonly classified as Insectivora and sometimes as Primates. Placing them as an order on their own is essentially cutting a Gordian knot. All 16 of its species, now classified in five genera, were discovered and named before 1900. The "Macroscelidea" also include only one living family, Macroscelididae, with four now recognized genera and fifteen species, all but one of which were known and named before 1900. They are called "elephant shrews" as they are superficially shrewlike and have a flexible snout that remotely resembles a proboscis. They are usually classified in the order Insectivora, and are left there in the latest (1983) revision of *Walker's Mammals of the World,* but are given separate ordinal position in the 1982 compilation here followed. The Dermoptera include only one living family, the Cynocephalidae, with one genus, *Cynocephalus,* with two species, both known and named in the eighteenth century. These are known as "colugos," a word said to be Malay although this is not found in a Malay dictionary and there is no letter *c* in written Malay. In English they are more commonly called "flying lemurs," although they do not fly but glide (like "flying" squirrels) and are obviously not lemurs. They are usually classified in the Insectivora, but not in the books here cited.

In the list here followed the ordinal entry between MARSUPIALIA and INSECTIVORA is given as ORDER EDENTATA (XENARTHRA). The classical usage, still to be found in some studies, includes in EDENTATA the Order here called PHOLIDOTA and sometimes also that here called TUBULIDENTATA. The present consensus, however, includes only XENARTHRA in the EDENTATA, thus making these two names synonymous. It is therefore clearer and more in accord with the consensus merely to call the order in question XENARTHRA.

It is noteworthy that of all the genera discovered in the twentieth century most of them—84 out of 126—were discovered before 1930. It is further interesting that the great majority belonged to only two orders: Chiroptera (23) and Rodentia (68), thus for these two orders 91 out of 126 in this century. Also note that the number discovered in the first decade (42) dropped to about half that in the second (22) and the third (20) decades and thereafter dropped consistently to less than one a year.

The Chiroptera and Rodentia are much the most numerous in individuals and the most diversified in species, genera, and families among living mammals. They also include many of the smallest and most obscure living mammals, being rivaled in this respect only by the Insectivora, which also include the third largest number of discoveries (12) in this century. Marsupials, also mostly small and localized ones, are runners-up, with 11 genera discovered in this century.

The high numbers of genera discovered early in the century are subject to some doubts. This may in part be due to the fact that Oldfield Thomas, a notorious splitter of specific and generic taxa, was especially active during the first two decades. In some cases he gave new generic names to species that he had himself earlier placed in genera previously discovered and named.

In the present tabulation there are ten orders in which no genera or families have been discovered in the present century, and two in which only from one to three genera have been found. Those with no discoveries

in the present tabulation have relatively few living families or genera: Monotremata, two families, three genera; Xenarthra, exceptionally five families and sixteen living genera, all known long before 1900; Scandentia, one family, five living genera, two named since 1900 but based entirely on species known long before; Dermoptera, one family, one genus, already known to Linnaeus in 1758; Sirenia, two families, three Recent genera, but one extinct since about 1770; Perissodactyla, three living families, six living genera, all known long before 1900; Hyracoidea, one living family, three genera before 1900; Tubulidentata, one living genus (and species, known and named in 1766); Pholidota, one living family, one genus known to Linnaeus in 1758; and Macroscelidea, one living family, four living genera, all based on species known long before 1900.

It is somewhat surprising that some orders with only one or two genera discovered since 1900 nevertheless have rather numerous living families and genera. The Carnivora, among the most varied orders with twelve living families, have only two genera discovered and named since 1900; *Chrotogale*, the genus and its one species named by Thomas in 1912, and *Osbornictis* with its one species named by Allen in 1919. Most interestingly in this connection are the Primates because many or most of the supposed hidden or mythical mammals of cryptozoology are considered to be primates by those who believe in them. In fact only one doubtful family and two objectively known primate genera have been discovered since 1900. *Callimico* was named by Mirando-Ribeiro in 1911 but was based on a species first known in 1904. This was placed in a supposedly distinct family, Callimiconidae, by Hershkovitz in 1977, but other mammalogists have placed it in the Callitrichidae, a family known since 1758. *Allenopithecus* was named by Lang in 1923 but based on a species known in 1907. The genus closely resembles the Cercopithecidae, and its type species perhaps should be kept in the genus *Cercopithecus*. As will be discussed later, there is absolutely no objective, autoptical evidence for any new species of primates since 1907 at the latest.

Genera First Found as Fossils and Later Found Alive

Burramys. This genus was found fossil in a cave deposit of probable Pleistocene age in Australia, and on that basis it was named *Burramys parvus*, new genus and species, by Robert Broom in 1896. In 1966 a living animal of the species was found in a ski hut well up in the so-called Australian Alps. That one individual soon died, but others of this species were found in the same climatically rigorous and limited environment.

In 1977 a then new family was named Burramyidae, and three other genera known much earlier have now been referred to this family. *Acrobates* Demarest, 1818, was based on a species already named by Shaw in 1793. *Cercartetus* Gloger, 1841, now includes a species named by Demarest in 1818. *Distoechurus* Peters, 1874, has as its sole species one named in the same publication. Thus a living species now placed in this family was already known and named in 1783, and a living genus now in the family was named in 1818. *Burramys* and the Burramyidae are not examples of cryptozoology.

Catagonus. This genus was named by Florentino Ameghino in 1904 with the type species *C. metropolitanus* Ameghino, 1904, from the Mid-Pleistocene of Argentina. In 1930 Carlos Rusconi named a supposedly fossil subspecies *Platygonus carlesi wagneri*, and in 1948 he made this a full species *Platygonus wagneri*. Although evidently Pre-Hispanic, the known specimens were subfossil and possibly geologically Recent or Holocene. In 1975 Wetzel, Dubos, Martin, and Myers announced that this species is still alive in the Gran Chaco, through a large area also extending into adjacent parts of

Argentina and Bolivia. The authors cited transferred Rusconi's species to Ameghino's genus *Catagonus*. It is definitely a peccary of the family Tayassuidae, the type genus of which is *Tayassu* Fischer, 1814. That genus has two living species. One, known as the white-collared peccary or javelina (pronounced as in Spanish), ranges from northern Argentina into southern Arizona and New Mexico. The other, known as the white-lipped peccary, ranges from northern Argentina to southern (old) Mexico.

Wetzel (especially in 1977) has shown that the subfossil species called *Platygonus wagneri* by Rusconi is the same as the living Chaco peccary and belongs to Ameghino's supposedly extinct genus *Catagonus*, not to *Platygonus*, a North American genus that spread into South America also during the Great Interchange (mainly Pliocene and Pleistocene) but is now apparently extinct on both continents. *Catagonus* and *Platygonus* are rather closely related and must have had a common ancestry, perhaps in an early form referable to *Platygonus*. *Catagonus* apparently evolved either in Central America or in South America. Although the mammalogists were so late in discovering *Catagonus* abundantly alive in the poorly explored Chaco, its presence there and its distinction from the other two living species of peccaries had been well known to native hunters for uncounted generations. This was then for professional mammalogists a genuine discovery of a genus (first as a subspecies) in 1948 and until 1975 considered extinct. However the lapse between Rusconi's subfossil and fossil recognition of the species' survival was short in geological terms and the species is just another, more localized peccary belonging to a family well known to mammalogists since Linnaeus in 1758.

Aproteles. This is another genus of mammals first known as a fossil and later found living. It is a fruit bat of the family Pteropodidae, the type genus of which (*Pteropus*) was known to Brisson in 1762 but was given a valid technical name by Erxleben fifteen years later. *Aproteles bulmerae* was based on fragmentary subfossil remains found in a kitchen midden in New Guinea by Hyndman in 1974 and published as a new genus and species by Menzies in 1977. Menzies had then assumed that the genus and species were extinct, but even before Menzies's publication Hyndman had sent in skulls and mandibles of this species found in 1975 in a large cave and evidently remains of living bats shot by natives with bow and arrow.

Hyndman returned to the cave in 1977 but found that the colony of *Aproteles* there had been killed or driven away by native hunters. In 1980 Hyndman and Menzies published a short note, with a figure of skull and jaw of *Aproteles bulmerae*, demonstrating that this genus and species had still been alive in 1975. However, search of other large collections of fruit bats from New Guinea did not turn up any other specimens. Hyndman and Menzies concluded in 1980 that this bat was probably extinct in eastern Papua New Guinea but might still survive in far western Papua New Guinea or in Indonesian New Guinea (West Irian).

Thus it is still not known whether this genus survives or is recently extinct. In any case, it was not a highly distinct genus or species, as it rather closely resembles *Dobsonia moluccensis* Quoy and Gaimard, 1830, which is still abundantly alive in New Guinea and also in the Molucca Islands and in northern Queensland, Australia.

Speothos. This genus of the dog family (Canidae) was named by Lund on the basis of late Pleistocene and probably early Recent fossils from a cave in the state of Minas Gerais, Brazil. The genus was named in 1839, and Lund ascribed two supposedly extinct species to it: *Speothos venaticus* and *S. pacivorus*. He also named a fossil and supposedly extinct species *Icticyon major*, which is now considered a synonym of *Speothos pacivorus*. This has been listed as an extinct species, but it may be only another name

for *S. venaticus*. Before the end of the nineteenth century it was found that *Speothos* is not extinct, and the living species is generally considered the same as *S. venaticus* of Lund. Although it hunts in packs, it is now somewhat sparsely distributed from Panama southward east of the Andes to far northern Argentina. The generic name was derived from Greek *speos*, "cave," in reference to its early discovery in a cave, and *thos*, jackal. The now well-known living species is generically distinct from jackals, which belong to the large genus *Canis*, and they do not frequent caves. They are now usually known in English as "bush dogs."

Speothos is clearly of North American ancestry. It probably evolved in tropical North America, and in any case its spread in South America was part of the late Cenozoic "Great Interchange" of North and South American mammals. Kurtén and Anderson (1980) have suggested that the immediate ancestor of *Speothos* was *Protocyon*, an extinct genus of canids known in the late Pliocene or early Pleistocene both in Texas and Argentina.

Some Other Supposed Survivors

Okapia. This is probably the genus most often cited by cryptozoologists as the known survival of an otherwise extinct group. In 1900 Sir Harry Johnston learned from a group of pygmies from the area now known as Zaire that there was in their forests an animal like a mule but with zebralike stripes in places. Sir Harry managed to obtain two pieces of striped hide from the animal that the pygmies called "okapi." He sent these to the eminent British zoologist W. L. Sclater, who, taking it to be a new species possibly of zebras, named it *Equus? johnstoni* in 1901. Later in that same year E. R. Lankester, also a British zoologist, on the basis of more material determined that this species belongs to a distinct genus of the giraffe family and designated it as *Okapia johnstoni*. The then new generic name was derived from a native African name "okapi" for the animal long known to them.

Giraffes were well known to the Greeks and Romans and the species was given the technical name *Cervus camelopardalis* by Linnaeus in 1758. Giraffes had been called "camelopards," a name derived through Latin from Greek *kamelopardalis*. There was a legend that giraffes were hybrids between camels and leopards ("pards"). (The present English name "giraffe" was derived through French from an Arabic name for these now strictly African animals.) In 1756 Brisson wrote that the animal did not belong to *Cervus*, the generic name for deer, and he gave it the distinct taxonomic name *Giraffa*. In 1821 Gray defined and published a separate family Giraffidae.

Fossil members of the Giraffidae had been known since 1860 and they range from Miocene to Recent in age. When the okapi had become known to Europeans, the suggestion was made that it might be a species of *Helladotherium*, long known as an early (Miocene) giraffid. This is, however, incorrect. In some respects *Okapia* is somewhat more like early giraffids such as *Paleotragus* Gaudry, 1861, (late Miocene to early Pliocene), but it has become distinctly different: (See Churcher, 1970, and Harris, 1976.) Fossils of *Giraffa* are fairly common in Africa from late Pleistocene to Recent, but only one dubious occurrence of *Okapia* in the Pleistocene is known. Thus *Okapia* is not a survivor of a known fossil genus, subfamily, or family. Furthermore, it is not true that "most people had doubted" the existence of okapis after they were known to Europeans, as stated by Heuvelmans (1959, p. 58).

Hexaprotodon. This generic name has engendered much confusion. It was first applied to fossils and has later been applied to some living hippopotamuses. It could thus be another genus first known as extinct but later found living. However, this is not at all clear or probable, and it is not in accord with the present usage of most mammalo-

gists. The name *Hexaprotodon* was published and defined by the British paleontologists H. Falconer and P. T. Cautley in 1836 as a subgenus of *Hippopotamus.* The name *Hexaprotodon* is derived from Greek words meaning "six front teeth" and refers to the number of incisors, three on each side in upper and lower dentitions. It was applied to fossil and supposedly extinct hippopotamuses from the Siwalik Hills, now in part in both Pakistan and India. At the same time Falconer and Cautley gave the name *Tetraprotodon* as a subgenus for the living *Hippopotamus amphibius* Linnaeus, 1758, which has two incisors on each side, upper and lower. *Tetraprotodon* is no longer used either as a genus or a subgenus, as it is essentially synonymous with *Hippopotamus.*

Like the giraffe, the common African hippopotamus was already known to the classical Romans and Greeks. In Greek it was called hippos potamios, literally "river horse," and variants of the Greek name have been passed down to almost all European languages, including modern English. As a generic name, *Hippopotamus,* it was adopted in the earliest work valid in present technical nomenclature, the tenth edition of *Systema Naturae* by Linnaeus, published in 1758. The likewise African pigmy hippopotamus, however, was not known to non-natives of Africa until early in the nineteenth century. It was named as a distinct species, *Hippopotamus liberiensis* in 1844 by Samuel Morton, an American naturalist (1799–1851). In 1852 another American naturalist, Joseph Leidy (1823–1891) maintained that the pigmy hippopotamus is a distinct genus, which he first named *Choerodes.* That proved to be a preoccupied name, and in 1853 Leidy named it *Choeropsis.* Leidy was a paleontologist as well as a zoologist, but his genus *Choeropsis* was based entirely on the living pigmy hippopotamus and he did not include any fossils under this name.

In 1977 two posthumous papers on hippopotamuses were published by Mrs. R. J. G. Savage under her previous married name S. C. Coryndon. She was a vertebrate paleontologist concerned with fossil mammals, especially those of Africa. (Much of her life was spent in Kenya.) In these final papers, published together, she maintained that the living *Choeropsis* Leidy, 1853, is a synonym of the otherwise fossil *Hexaprotodon,* publication of which antedated that of *Choeropsis* by seventeen years. She did not base this synonymy on the number of incisors, which in the type species is six (three on each side) both above and below and not four (two on each side) as in *Hippopotamus* and *Choeropsis.* She also referred a number of Eurasian and African fossil species to *Hexaprotodon,* although they had four incisors and not the six implied in their generic name. Her reference of seven fossil species and the living species *liberiensis* to *Hexaprotodon* was based on some characters of the skull (when known in the fossil species), wear on the incisors (hence nature of the bite), and proportions of some known limb bones. *Choeropsis liberiensis* does somewhat resemble fossil *Hexaprotodon* in some of these characters, but it seems about equally like *Hippopotamus* in other respects. Coryndon's own phylogenetic diagram shows *Choeropsis liberiensis* branching separately from that of fossil species of *Hexaprotodon* although from a common ancestor, but it also shows *Hippopotamus,* fossil and recent, branching from the same ancestry although inferentially somewhat earlier.

Almost all mammalogists now consider *Choeropsis* to be a distinct and valid genus. It is not known in Eurasia, where *Hippopotamus* was widespread in the late Cenozoic but is now extinct. It probably evolved somewhere in Eurasia and migrated to Africa over a land connection in the Pliocene. Up to now only one fragment of *Choeropsis* has been found fossil in the Pleistocene, and the generic identification of that specimen is decidedly dubious. It seems probable that *Choeropsis* evolved locally in Africa. (The

genus has also been reported fossil or subfossil from the Mediterranean and from Madagascar, but those generic references may be incorrect and based only on island dwarfing of species of *Hippopotamus.*) The upshot of this somewhat tangled tale is that *Choeropsis* is not clearly known as a fossil, has never been considered extinct, and is definitely not an example of the discovery as still alive of a supposedly extinct animal.

It is of interest here, although digressive, that in the second of her two posthumous publications Coryndon described as new a fossil species from the "earliest Pleistocene" of Africa as *Hexaprotodon karumensis.* From the description and illustrations, this certainly appears to be a valid species, but so extraordinarily peculiar that it cannot be reasonably assigned to any but a new and otherwise unknown genus. The other surely known genera of hippopotamids are only *Hexaprotodon* (extinct as such), *Choeropsis* (living), and *Hippopotamus* (living).

Megalonychidae. The status of this family, its included taxa, and its survival into either the geological or the colloquial "Recent" or "recent" are uncertain and disputable. Several genera and species clearly of this family are now known as fossils, only, in the West Indies (Hall and Kelson, 1959, and Hall, 1981; the two editions cited have the same title, and both include the West Indies as if parts of North America). These fossils are sub-Recent in geological terms or quite possibly Recent. There is evidence that they were still living when the pre-European Carib Indians reached the islands. They are certainly now extinct, and it is probable for some or all that their extinction was caused by the Indians.

A different part of the problem depends on the classification of *Choloepus,* the genus of two-toed tree sloths with two living species confined to Central America (Nicaragua and southward) and to lowland South America. The classical arrangement by neomammalogists was to place this genus in the similar living tree sloth family Bradypodidae, also a lowland and mainly tropical South American group, the type genus, *Bradypus,* with three living species. Paleomammalogists, however, since the 1960s have been generally agreed that *Bradypus* and *Choloepus* had quite different ancestors among early so-called "ground sloths." This has been accepted by a consensus of neomammalogists to the extent of placing *Choloepus* in a separate family Choloepidae. Lately, however, a paleommalogist has placed *Choloepus* in the otherwise "ground sloth" family Megalonychidae (Webb, in Montgomery, *in press* as of 1983). If this becomes generally accepted, *Choloepus* will be considered as the lone genus surviving from an otherwise extinct family replete with fossil genera. Even if accepted, this would hardly be an example of a clear-cut cryptozoological discovery of another survivor previously considered extinct. *Choloepus* was known and named by Illiger in 1811 and *Megalonyx* was not validly named by Harlan until 1825. In any case, the fossil genus *Megalonyx* and the living genus *Choloepus* are so very different that it never occurred to a systematist to collocate them except in the large and vague category of "sloths" until well into the twentieth century.

Heptaxodontidae. Somewhat similar doubts and questions arise for this family of hystricomorph or caviomorph rodents as for the Choloepidae or Megalonychidae among the Xenarthra. Genera now usually ascribed to this family were varied and abundant in the geological sub-Recent or Recent of the West Indies. One genus from there, *Amblyrhiza,* was described and named by the paleontologist Cope in 1868. Five more closely related genera including the type genus of the family, also from the West Indies, were defined and named by the neomammalogist Anthony in 1916, 1917, and 1920. In 1917 Anthony also placed these as a subfamily of Dinomyidae, a related South American family with one living genus, *Di-*

nomys. In 1918 Miller and Gidley raised the Heptaxodontinae to the family level, and in 1929 Miller described and named another West Indian genus, *Quemisia. Heptaxodon* itself is probably a synonym of a previously named West Indian genus, *Elasmodontomys* Anthony, 1916, but under the present International Code of Nomenclature this does not invalidate the family name Heptaxodontidae.

Continental South American fossil rodents clearly related and generally referred to this family are abundant in the Miocene and Pliocene. Many South American genera have been named, mostly by Florentino Ameghino and Lucas Kraglievich, and the latter also named several families now generally considered synonymous with or subordinate to the Heptaxodontidae. There is no serious doubt that the family was of continental South American origin and that it is now extinct, even though in the West Indies it probably lived on into the geological or even the historical recent. There is here no question of belated or cryptozoological rediscovery of a family of mammals, as a member of this one was known as a fossil in 1868 and no scientific zoologist ever saw one alive.

Families Discovered in the Twentieth Century

Only two families of living mammals have been discovered in the fully objective and autoptical sense during the present century. This entails ipso facto the simultaneous discovery of a new genus and species in each of these two families. It is not surprising that these two families belong to the two orders most abundant and diverse in the present mammalian faunas of the world: the bats (Chiroptera) and the rodents (Rodentia).

There has been some confusion as to who first described and named the rodent family Seleviniidae, genus *Selevinia,* and species either *Selevinia betpakdalaensis* Belosludov and Bashanov, 1938, or *Selevinia paradoxa* Argyrapolo and Vinogradov, 1939. The former authors and their name apparently have priority. The animal involved, now fairly well known, was found in the Betpak-Dala desert in Kazakhstan, U.S.S.R. It seems to be most nearly related to the dormouse family Gliridae, but it is so extremely aberrant that there has never been any question about its classification in a distinct and well-defined family. Nothing more is clearly known about its ancestry or relationships, and it was obviously not the discovery of a foreseen, even a hinted, or a mythical hidden animal. The fact that it is small (between three and four inches in head and body length) and lives in a remote and little frequented desert explains its late discovery. The most nearly related family, Gliridae, was known to Brisson in 1762, and the etymology of the English vernacular name "dormouse" suggests that existence of this family had been known to western Europeans many generations earlier.

The bat family Craseonycteridae, genus *Craseonycteris,* species *Craseonycteris thonglongyai* Hill, 1974, were found at Sai Yoke, Kanchanaburi, Thailand some time prior to 1974 and named by J. E. Hill on the basis of a specimen sent to the British Museum (Natural History). It is still known only from the locality where it was first found. It is the smallest known bat and has been compared with a bumblebee for size. It may be the smallest of all known living mammals, in this respect rivaled only by a very small shrew such as *Suncus etruscus.* (Some early fossil mammals were smaller than any now living.) It most nearly resembles the genus *Rhinopoma,* in the vernacular the three species of mouse-tailed bats, but *Craseonycteris* differs obviously in the complete absence of a tail, much smaller size, and other details. Here again the small size of the animal and its limited and remote geographic range explain its late and unheralded discovery. It also roosts in small caves as far as possible from their entrances.

The fact that these discoveries of definitely new and distinct families of living mammals have been only two in the course of more than 80 years, holds out little promise of other discoveries soon, if ever, of equally or more distinct taxa of mammals. That is especially true as those rumored are larger and nearer to home for the many hunters.

Credo Quia Impossibile

Humans are the most inventive, deceptive, and gullible of all animals. Only those characteristics can explain the belief of some humans in creationism, in the arrival of UFO's with extraterrestrial beings, or in some aspects of cryptozoology.

In several respects the discussion and practice of cryptozoology sometimes, although not invariably, has demonstrated both deception and gullibility. An example seems to merit the old Latin saying "I believe because it is incredible," although Tertullian, its author, applied it in a way more applicable to the present-day creationists.

In 1920 a Swiss geologist (not a zoologist or paleontologist) named François de Loys was exploring along the border between Venezuela and Colombia. There, according to his report, he or his companions killed a male in a group, as he claimed, of apelike animals. He propped up the dead animal and photographed it. He did not bring back any part of the animal but he claimed that it had no tail and (at different times) that it was about 4 feet 5 inches or about 5 feet 2 inches tall. The photograph, sole evidence that the creature existed at all, does not show whether it had a tail or not or make possible any check on its height. On the basis of this photograph and of Loys's varying statements a French Professor Georges Montandon "identified" the animal as an anthropoid ape (the only one "known" outside of Asia and Africa) and named it *Ameranthropoides loysi* (Montandon, 1929). There is no reason to doubt that Montandon acted in good faith, but he did not display good sense. The photograph, which is the only objective evidence, is quite surely of a spider monkey of the well-known genus and species *Ateles belzebuth,* which occurs in the region where Loys said the animal was killed. This species was named by Geoffroy in 1806, and the genus was already known to Linnaeus in 1758. A mature adult would be about as tall as Loys's statement (or guess) if it stood up on its hind feet, which was apparently assumed by Loys. To be sure, *Ateles* and all other known South American monkeys have fairly long tails. As to this, one can only assume that Loys was lying, and that he posed the dead animal on a box so that its tail did not appear in the photograph.

Heuvelmans (1959) devoted a whole chapter (chapter 14, pages 305–328) to this supposedly "unknown animal." His book, which in effect started subsequent interest in cryptozoology, had as frontispiece a copy of Loys's photograph, titled as "*Ameranthropoides loysi,* the only 'unknown' animal of which there is a good photograph." Heuvelmans, like Montandon, may be assumed to have acted in good faith, but evidently not with good sense. He concluded that the existence of a South American great ape could not be disputed "except by the disingenuous or the blind." Yet the area where the animal was reported by Loys had been explored since the beginning of the 19th century and has been ever since then without any sign of a primate remotely resembling a great ape.

In that same work Heuvelmans discussed other "hidden animals" that have become classics for later cryptozoologists. Notably the "yeti" or "the not so abominable snowman" has a chapter of 56 pages. He also devoted some attention to "the Queensland marsupial tiger," which is no longer taken seriously even by cryptozoologists. Heuvelmans did, however, treat with better judgment the "impossible" New Zealand "waitoreke" (not a Maori name) and the mythical

Patagonian "Iemisch" (not an Indian name), also called "*Neomylodon.*"

Such of Heuvelmans's "unknown animals" as have been scientifically identified have turned out to be long known. The African "nandi bear," for example, has been found to be a honey badger or ratel, *Mellivora capensis,* already known to zoologists in 1776—a possibility that Heuvelmans mentioned but rejected. On the other hand the "orang pendek," also called a "sedapa" or a "sindai," a supposed small semi-human Sumatran animal, still seems to be an unidentified or solely mythological creature. In the Indonesian language "orang pendek" or "orang pandek" means "short person (human)." "Sedapa" is probably a version of "sedap," meaning "delicious" (to eat). "Sindai" does not appear to be an Indonesian word. This "unknown" may have been a dwarf human or if not purely mythical probably a Malayan bear, *Helarctos* (or *Ursus*) *malayanus,* a small bear occurring in Sumatra and known since 1821 at latest.

Moving on, there is a marginally cryptozoological study, one of the few by a leading zoologist, anthropologist, and anatomist, John Napier (1973). Under the term of "Bigfoot," Napier includes both the Asiatic (mostly Himalayan) Yeti or "Abominable Snowman" and the northwestern United States and western Canadian "Sasquatch." (Heuvelmans had missed the latter.) Napier went over the masses of evidence, or supposed evidence. He concluded that, "If we confine ourselves rigidly to what most scientists would regard as hard evidence, then the answer is heard loud and clear: *Bigfoot does not exist.* There is no scrap of hard evidence. . . ." As an anthropologist Napier thinks that for ethnological and psychological reasons, and perhaps for genetic ones, humans need folktales such as those of Bigfoot. On the available indirect evidence, he discards the reality of the Yeti. Yet he finds himself "convinced that the Sasquatch exists, but whether it is all it is cracked up to be is another matter altogether." This is in the face of recognition that many of the footprints are hoaxes and that many of the citings are either hoaxes or "psychological abnormalities"—and yet that Sasquatch does exist if *any* are true. Finally he says, "Man needs his gods—and his monsters—and the more remote and unapproachable they are, the better." And then a postscript: "Perhaps by the time this book is published somebody will have discovered a Bigfoot. I hope so; but if not, I will happily settle for the myth."

As this is being written, ten years have passed since Napier's book was published. No Bigfoot has been discovered.

Less than ten years ago, in 1978, Heuvelmans followed up with another book in French, on "The Last Dragons of Africa." In the first issue of the journal *Cryptozoology* there is a review of Heuvelmans (1978) by Jean-François Trape (1982), an overseas (ORSTOM) French scientist stationed in Brazzaville, People's Republic of the Congo. While paying due homage to the "Father of Cryptozoology," Trape goes on to say that it is "always rather risky to draw excessively definitive conclusions from simple statements by witnesses. . . . The problem becomes still more delicate when it comes to second-hand reports even if obtained directly from witnesses." Finally, with reference more specifically to the belief that dinosaurs survive in Africa, Trape concludes that

> . . . these several decades without concrete proof of the survival of such animals is beginning to have a weight much heavier than the 70 million years without fossil evidence. While no hypothesis should be excluded *a priori*—and that is indeed the very essence of cryptozoology—one must admit that time is not working in favor of the "last dragons of Africa!"

The present essay is not concerned with dinosaurs, but it is concerned with Heuvelmans's statement that, along with aquatic dinosaurs, amphibious machairodonts (sa-

bertooth "tigers," which became extinct not 70 million but less than 1 million years ago) are still present in Africa. No machairodonts were amphibious, and there is no objective evidence that any survive anywhere.

Another fairly recent book by Canadian John Green (1978) about "Sasquatches" is a prolix gathering of indirect evidence. It oddly, confusingly starts out by stating that the author does not believe in Sasquatch, but then goes on to give supposed reasons why one should believe. Still another book, a symposial volume edited by R. Sprague and G. S. Krantz (1979) indicates that much of the "evidence" for the Sasquatch is admittedly faked. Still another, edited by Marjorie Halpin and Michael Ames (1980), is a collection of papers read at a conference on "Manlike Monsters" (mainly the so-called Sasquatch) held in 1978 at the University of British Columbia (in Canada). There is a review of this book, seven pages long, by Grover S. Krantz (1982). One would expect that attendants at such a conference would tend to be favorable to the existence of the Sasquatch, but as analyzed by this reviewer ten of the twenty-four articles published are "Skeptical," nine are "Neutral," and only five are "Favorable."

With the current enthusiasm for Yetis and Sasquatches one might think that no more is necessary to suffice for what Napier (1973) has called the "primeval urge," perhaps genetic programming, for at least some humans to need monsters, whether natural or unnatural, real or mythical. New candidates for these roles are nevertheless still added to the long list that includes the "Bigfeet." An example is provided by Roy Wagner (1982), who is head of the Department of Anthropology (not zoology) at the University of Virginia. He had been doing field studies of the humans on New Ireland, which is a narrow, elongated island at a considerable distance northeast of Papua New Guinea, although politically a part of that country. Here he was repeatedly told of creatures called *a ri* in Bartok, which is one of the Melanesian languages. The accounts varied greatly, and some were similar to the "menagerie" that Wagner recognized as "rather fanciful 'bush' creatures—spirit beings, monsters, and fearsome animals." There were, however, repeated descriptions of the *a ri* as marine creatures resembling human males and females from their heads to their genitalia but without legs and ending in a fishlike lower part with lateral fins. He was assured that Europeans (and evidently Americans, too) knew all about *a ri* because "you put pictures of them on matchboxes and canned goods." Reference was to pictures of mermaids. The *a ri* were said to be very common, seen every day, known to everyone, and eaten by some. Nevertheless, while living with his informants, Wagner never definitely saw one. Only one was pointed out to him as an *a ri,* but he saw only "a long dark body . . . which submerged and did not reappear." Wagner does comment that, "It is difficult to understand how such disparate perceptions"—mythical projections—"of the *ri* have come about." He finds that "the physical descriptions of the *ri* also pose problems," which he does not explicitly discuss.

This article by a presumably capable anthropologist posits a mammal that is not merely unknown but is impossible. The most logical inference is that Wagner put together in his own imagination elements in a varying folk story widespread among his informants, and also that it is quite possible that the natives were enjoying leading a white man up the garden-path, as the English say, or kidding him, as Americans say.

Discussion and Conclusions

It is evident that cryptozoology is interesting to many people, including some who reject its definitions, methods, and proclaimed results. For those who support cryptozoology, it also seems clear that this subject

satisfies some emotional need or perhaps some inborn tendency. The cryptozoological animals here previously exemplified among supposed mammals include various distinct categories. What they include are kinds (zoologically speaking, taxa) of animals supposedly now living but considered hitherto extinct or unknown.

The supposed examples of cryptozoological animals that have had the most extensive publicity at a journalistic level, at least, are two groups of reptiles: plesiosaurs and dinosaurs. Paleontologists considered and still do consider these taxa extinct since the end of the Cretaceous, some 65 million years ago. The most diligent search by skilled paleontologists for more than two centuries now has not turned up any evidence of post-Cretaceous Plesiosauria or Sauropoda (one of the two main taxonomic groups of dinosaurs). The cryptozoological supposed members of these major taxa now most diligently pursued, but not yet found or objectively identified, are the Scottish "Loch Ness monster," which has aspects of being a publicity stunt, usually as a supposed surviving plesiosaur, and the African Mobele-Mbembe, which has aspects of the entirely mythical or folkloric, but has been sought in vain so far as a surviving sauropod dinosaur. (A dubious plesiosaur has also been reported from Lake Champlain, and a more than dubious dinosaur from Florida.)

Among the mammals that have been the subject of cryptozoological enquiry or speculation there have been: hoaxes, for example *Ameranthropoides;* purely mythical or folktale inventions, for example the African "nigve," which as described by African natives could not have been a pigmy hippopotamus but was later thought to have been; a native name not understood by Europeans but eventually identified as a mammal long known to zoologists, like the African "nandi" (also known regionally as "chimoset," "isata," and so on, depending on the local dialect) which turned out to be in most if not all cases a ratel, an animal which had been known to scientific zoologists since 1776; or an animal known first as a fossil but later found living, like the Australian marsupial *Burramys* and very few other examples involving only fossils known to have been of almost recent age; or, most touted, animals like the sasquatch and many others assumed to exist on testimonial or circumstantial grounds alone but never found as real objective and autoptical animals.

Among mammals perhaps the most extraordinary example of an ignorance of the science of zoology and downright silliness was provided by a Russian, B. F. Porshnev. From 1966 until 1974, the year of his death, he was supporting a "revolution in primatology" which was a succession of one blunder after another (see Porshnev, 1974). The major points of this example of cryptozoology are: first, that the only genus and species of the human family is *Homo sapiens;* second, that this had as an ancestor the missing link (between apes and humans) *Troglodytes fossilis,* which name he used for Neanderthal man; third, that this species was an animal and therefore did not belong to the human family; and finally, that *Troglodytes* in the form of *Troglodytes recens* is still living. There is no evidence at all for his conclusion, and his attempted classification is one blunder after another. He ascribed *Troglodytes* to Linnaeus as a generic term, but Linnaeus (1758) used *Troglodytes* (from Greek for "cave dweller") at first as subordinate to *Homo* and with two species *H. nocturnus* and *H. sylvestris,* the latter as applicable to the Orang Outang, a form of the Malay name still used in colloquial English orangutan. (In Malay it means "forest human," a far cry from "cave dweller.") Linnaeus later used the combination *Simia troglodytes.* In 1758 he gave the geographic habitat as Africa ("Aethiopia") and caves in Java, Amboina, and Ternate. In 1758 Linnaeus was evidently including gorillas and orangutans in a taxon (of somewhat uncertain level) *Troglodytes.*

In 1812 E. Geoffroy defined a genus *Troglodytes,* but that was preoccupied by the same generic name given to a bird by Vieillot in 1806 and was replaced by the name *Pan* Oken, 1816. *Pan troglodytes* (Gmelin, 1788) is now the accepted name of the common African chimpanzee. (Linnaeus' geographic reference for the orangutan was incorrect, following vague statements by explorers of the East Indies; the species now called *Pongo pygmaeus* is confined to Sumatra and Borneo, but there is fossil evidence for its presence in the Pleistocene and early Recent in Java and on the southeastern part of continental Asia.)

These matters of nomenclature and classification, here simplified and abbreviated, are important to the extent that they show that Porshnev had little or no grasp on scientific zoology and also on historical or physical anthropology. An English translation of a Russian summary was published in *Current Anthropology* in 1974, shortly after Porshnev died. In the style of that journal, the manuscript was referred to six noted anthropologists in Spain, India, and the United States for comments to be published with the article. All six severely and adversely criticized Porshnev's views and expression of them. As he could not reply to this concerted rejection, a reply, much longer than Porshnev's article or any of the criticisms, was written by two Russians, Bayanov and Bourtsev, and was published in the same issue of *Current Anthropology.* In a later issue they followed this up with another article (Bayanov and Bourtsev, 1976) in which they argued for the survival of Neanderthals based on some ancient statues and ceramics and on the extensive literature on "wild men"or "wolf-children" (for example Singh and Zingg, 1942). These latter are not relevant to the argument, as they were supposed to be feral *Homo sapiens* and not prehuman survivors.

The comment here that Porshnev's work is an example of cryptozoology is justified by the fact that Heuvelmans in 1974 (the year of Porshnev's death) published in French a statement that "Neanderthal man is still alive," with Porshnev as junior author. As justification for the judgment that this was about the nadir for cryptozoology, a comment by Emiliano Aguirre, an excellent Spanish anthropologist and vertebrate paleontologist, will suffice. About Porshnev's infra-man Aguirre wrote, "Let us not classify it before we find it." This statement applies to the miscellany of cryptozoology as a whole. It is absurd to consider cryptozoology as an equal adjunct to zoology and to state as its mission the completion of the roster of living animals.

In the present study objectively known living (geologically and historically Recent) mammals are used as a way to determine how much cryptozoology has in fact contributed to the modern science of zoology, and also to estimate the probability of any future discovery of new and distinctive taxa of mammals. Mammals are better for this purpose than most other high taxa. At the levels of genera and families, living mammals are now more completely known than any other class of animals, with the possible exception of birds. The preceding table of numbers of genera discovered in this century in the various orders of this class and the subsequent discussion give a basis for measurements of these accomplishments up to now and for estimation of probabilities for the future.

The intensive search for new taxa in the classification and nomenclature of mammals is formally dated from the tenth edition of the *Systema Naturae* of Carolus Linnaeus in 1758. Discoveries, clearly abundant by 1758, reached a height in the nineteenth century, and from higher to lower taxonomic levels the rate of objective discovery has thereafter been diminishing. Attention is here focused on the twentieth century as the span of time in which completion has been approached, and also the whole span of the formation

of cryptozoology as the "science" of reaching that completion.

As previously noted, the rate of discovery of genera has markedly diminished during this century, and it is now and has been for the last fifty years below one genus per year. None of these genera were discovered by following cryptozoological, i.e., non-objective, principles. Since among mammals the cryptozoological search is largely for supposed primates, it is significant that no objective genera of primates have been discovered since 1907, at the latest.

There are only four genera of mammals first found as fossil and later found living. In all of these the known fossil species, as well as genera, were of late Pleistocene or early Recent age. All belonged to families with other genera and species known long before these. There is no significant time gap here and no discovery of a previously truly unknown species, genus, or family. As previously noted, the only completely novel families, genera, and species discovered in the last fifty years are the Craseonycteridae, based on a species of bats, *Craseonycteris thonglongai* Hill, 1974, and a rodent family Seleviniidae, type-species *Selevinia betpakdalaensis* Belosludov and Bashanov, 1938.

As both these discoveries were of relatively small animals found in rather remote regions, in caves in Thailand and in a desert in Kazakhstan, respectively, it might be hoped that a further search in unlikely places may yet reveal many more novelties among known, living mammals. It is important to note not only when, but where, fairly late discoveries of mammals have been made. The whole world has been searched for living mammals for well over two centuries now. It is not surprising that the most distinctive species, genera, and few families discovered in the present century were small animals in unusual and remote environments. This fact has led naturalists to explore intensively just such places, although with decreasing success.

In Australia *Burramys*, long known as a fossil, was discovered alive as late as 1966. It was in the only alpine environment in that continent, a region now a national park, with a museum demonstrating its fauna, crowded with tourists in summer and with skiers in winter. Another Australian marsupial, *Wyulda squamicaudata* Alexander, 1918, was discovered in a West Australian part of the extensive Australian deserts, but those areas, too, have been extensively scoured for novelties since then, without really significant further discoveries. Goeldi's marmoset, discovered in the rain forests of the Amazon Basin, was named as a species in 1904, raised to a monotypic genus in 1911, and to a monotypic family in 1977. (The latter ranking is disputed.) Since 1904 the Amazon Basin and its rain forest (now rapidly being cleared) have been thoroughly explored for mammals. The distribution of species of primates and of genera of all families there is well known, and discovery of any new mammals above the species level there is quite unlikely.

The dense forests of Western New Guinea (Indonesian Irian Jaya) have not been exhaustively explored for their fauna. There are quite a few field records and specimens from there, but it is quite possible that some obscure, small, mammalian species may still be discovered in New Guinea.

The likewise dense forests of western equatorial Africa have yielded some distinctive new mammals and have recently been reexamined in part by cryptozoologists, but unsuccessfully. They may still hold some undiscovered species of mammals, although this is unlikely. Two striking and rather large mammals have been discovered there, in the sense of "discovery" as a knowledge of them by non-tribal people and their definition and naming by zoologists. These are the pigmy hippopotamus *Choeropsis*, known as noted above to zoologists as early as 1852, and the giraffid *Okapia*, defined and named in 1901. Both of these genera belong to families

known from antiquity, long before Linnaeus and 1758. No large living mammal, not to mention dinosaurs, has been discovered in Africa since 1901. In South America the largest mammal recently clearly identified, defined, and named is the Chaco peccary, a survivor of the Pleistocene genus *Catagonus*, as also noted above. It had surely been known to the tribal Indians from time unmeasured, and almost as surely known to early Spanish explorers but probably known to them only as peccaries, originally a Tupi (Amazonian Indian) name, or by one of their names in Guarani, the tribal Indian language still current in Paraguay.

In this connection, it is relevant that the reported footprints and claimed sightings of the most discussed cryptozoological mammals are in regions quite thoroughly known by many people, including zoologists. The yeti is supposed to be in a region of difficult access, from about 12,000 to about 22,000 feet of altitude in the Himalayas. There are residents in the lower part of this range, and every year there are expeditions of competent humans into the higher parts. As for the footprints and claimed sightings of the sasquatch, these have occurred in well-populated regions in British Columbia, Alberta, Washington State, Oregon, and northern California. It is simply incredible that so many educated people, including professional zoologists and anthropologists, should have failed to produce any objective evidence that yetis or sasquatches do exist. (A supposed yeti scalp proved to be a hoax; a poor film of a supposed sasquatch could well be a hoax also.)

As to prediction of future discoveries, on present evidence this can be done only in a general way, but there is relevant evidence. After so many futile years, the chances of objective and adequate evidence for the living zoological reality of the yeti or the sasquatch are extremely small. There is some reasonable probability of the discovery of new living species of mammals objectively and taxonomically established, within the next few decades. There is a slighter probability of the discovery of decidedly new genera but here, too, there remains a possibility. The chances of any discovery of new living families are very slight. That new family taxa, including species and genera already known, will be proposed and named in the future is highly probable, but that will not be discovery in an acceptable sense. That really and entirely new taxa above the level of families will be discovered is improbable, approaching or reaching zero as the taxa are higher in the hierarchy of classification.

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